CLAIMS

1. A dispersion compensation element compensating chromatic dispersion of an optical pulse input from outside, characterized by comprising:

a waveguide guiding said optical pulse from an input edge to an output edge; and

dispersion varying means for making variable the absolute value and the sign of chromatic dispersion given to said optical pulse in said waveguide.

2. The dispersion compensation element according to claim 1, characterized in that said dispersion compensation element is formed by arranging two materials having different dielectric constants alternately and periodically in a direction in which said waveguide continues, and a plurality of regions different in combination of the size and the interval of one said material existing in the other said material are arranged along a direction in which said waveguide continues.

3. The dispersion compensation element according to claim 2, characterized in that a plurality of said regions are mutually different in sign of chromatic dispersion for said optical pulse.

4. The dispersion compensation element according to claim 2, characterized in that a plurality of said regions are

mutually different in order of chromatic dispersion for said optical pulse.

5. The dispersion compensation element according to claim 4, characterized in that said dispersion compensation element compensates chromatic dispersion of up to the nth order, and said regions are provided in a number of 2(n-1).

6. The dispersion compensation element according to claim 2, characterized in that a plurality of said regions are provided in an arrangement such that reflection of said optical pulse in the boundary between said regions in tandem with each other is minimized.

7. The dispersion compensation element according to claim 2, characterized by comprising an energy supplier for supplying energy changing the refractive index of said waveguide independently from outside for each said region of said waveguide as said dispersion varying means.

8. The dispersion compensation element according to claim 7, characterized in that said energy supplier applies a voltage to vary the carrier density of said waveguide to change the refractive index of said waveguide.

9. The dispersion compensation element according to claim 8, characterized in that said dispersion compensation element

further comprises a terminal unit different in carrier density from said waveguide, and

said energy supplier for applying a voltage is electrically connected to said terminal unit.

10. A dispersion compensation element compensating chromatic dispersion of an optical pulse input from outside, characterized by comprising:

a waveguide guiding said optical pulse from an input edge to an output edge; and

dispersion varying means which is different in carrier density from said waveguide and makes variable chromatic dispersion given to said optical pulse in said waveguide by applying a voltage from outside to change the refractive index of said waveguide.

11. An optical crystal characterized in that said optical crystal comprises a periodic arrangement layer formed by arranging alternately and periodically two materials having different dielectric constants, and

said periodic arrangement layer is provided thereon with a continuous defect part in which one of said material arranged periodically in the other material is made continuously defective, and

a plurality of regions different in characteristics associated with periodic arrangement of one said material in

the other material in a direction in which said continuous defect part continues are formed.

12. The optical crystal according to claim 11, characterized in that in said periodic arrangement layer, a plurality of said regions are mutually different in absolute value or sign of chromatic dispersion given to an optical pulse when said optical pulse passes through said continuous defect part.

13. The optical crystal according to claim 11, characterized in that another layer formed with a material different in refractive index from said other material forming the periodic arrangement layer is deposited on said periodic arrangement layer.

14. The optical crystal according to claim 11, characterized in that in said periodic arrangement layer, said continuous defect part is two-dimensionally formed.

15. The optical crystal according to claim 11, characterized in that said continuous defect part is formed linearly from one end side of said periodic arrangement layer toward the other end side thereof.

16. The optical crystal according to claim 11, characterized in that said periodic arrangement layer is provided thereon

with a region of different density different in carrier density from said continuous defect part.

17. The optical crystal according to claim 16, characterized in that said region of different density has a carrier density higher than that of said continuous defect part.

18. The optical crystal according to claim 16, characterized in that said region of different density has an area larger than the areas of said plurality of regions.

19. Dispersion compensation system for an optical pulse propagated via an optical pulse transmission line, characterized by comprising:

an optical pulse pickup unit provided on said optical pulse transmission line and picking up said optical pulse propagated via said optical pulse transmission line;

a dispersion compensation unit provided on said optical pulse transmission line and giving chromatic dispersion to the optical pulse propagated via said optical pulse transmission line; and

a control unit controlling the absolute value and the sign of chromatic dispersion given to said optical pulse by said dispersion compensation unit based on said optical pulse picked up by said optical pulse pickup unit.

20. The dispersion compensation system according to claim 19, characterized in that said dispersion compensation unit comprises:

a waveguide comprising a plurality of regions mutually different in chromatic dispersion given to said optical pulse input from said optical pulse transmission line; and

an energy supplier for supplying energy changing the refractive index of said waveguide independently from outside for each said region of said waveguide, and

said control unit controls the amount of energy supplied by said energy supplier to control the absolute value and the sign of chromatic dispersion given to said optical pulse by said dispersion compensation unit.

21. The dispersion compensation system according to claim 20, characterized in that said dispersion compensation system further comprises a data storage unit storing data in which characteristics of said optical pulse picked up by said optical pulse pickup unit are associated with the amount of energy supplied by said energy supplier, and

said control unit controls the absolute value and the sign of chromatic dispersion given to said optical pulse by said dispersion compensation unit, according to the data of the amount of said energy obtained by referencing said data storage unit, based on said optical pulse picked up by said optical pulse pickup unit.

22. A dispersion compensation system for an optical pulse propagated via an optical pulse transmission line, characterized by comprising:

an optical pulse pickup unit provided on said optical pulse transmission line and picking up said optical pulse propagated via said optical pulse transmission line;

a dispersion compensation unit provided on said optical pulse transmission line and giving chromatic dispersion to the optical pulse propagated via the optical transmission lime; and

a voltage control unit controlling a voltage applied to the dispersion compensation unit for changing the refractive index of said dispersion compensation unit by varying the carrier density of said dispersion compensation unit, based on said optical pulse picked up by said optical pulse pickup unit.

23. A dispersion compensation method characterized by comprising the steps of:

picking up an optical pulse propagated via an optical pulse transmission line;

determining the absolute value and the sign of chromatic dispersion given to the optical pulse propagated via said optical pulse transmission line, based on said optical pulse picked up; and

varying chromatic dispersion given to the optical pulse propagated via said optical pulse transmission line, based

on the determined absolute value and sign of said chromatic dispersion.